

# In-Class Worksheet 11: Computable Reductions

Clarissa Littler

November 20, 2014

Construct the following reductions

- A computational reduction from the ordinary halting problem to  $H_{TM} = \{ M \mid M \text{ halts on every input} \}$
- A computational reduction *from* the language  $\{ 0^{2^n} \mid n \geq 0 \}$  to the language  $\{0\}$  (this is actually an example of a more general principle)
- A reduction from the language  $\{(N,w) \mid N \text{ is an NFA that accepts } w\}$  to the language  $\{(M,w) \mid M \text{ is a DFA that accepts } w\}$
- A reduction from the  $E_{TM} = \{ M \mid L(M) = \emptyset \}$  to  $L_{TM} = \{ M \mid M \text{ loops on every input} \}$
- Construct a reduction from  $\overline{A_{TM}}$  to  $E_{TM}$
- Prove that  $A_{TM} \leq \overline{E_{TM}}$
- Prove that  $0^n 1^n \leq 0^n$
- Prove that  $EQ_{TM}$  is not decidable